Monitor for evidence of serious pathology:
- Infection
- Distal neurovascular deficit (DVT, AECS, CPN involvement)

Goals:
- Protect the graft
- Control pain and swelling/effusion
- Restore/preserve range of motion
- Muscle activation
- Normal gait and movement patterns

Post-operative time-based restrictions:
- Knee ROM limited to 0-90° for 2 weeks
- PWB (40% bodyweight) for 6 weeks
- Brace to be worn at all times for 12 weeks
- Avoid hyperextension, external tibial rotation, posterior tibial sag and varus for 16 weeks
- Avoid open chain isolated hamstrings exercises for 16 weeks
- Avoid breaststroke, side stroke and whip kicking action in pool for 16 weeks
- Avoid running for 20 weeks
- Progressive return to play if confirmation of stability on stress X-ray at 6 months

Phase 1 rehabilitation:
- PEACE protocol for management of pain and swelling/effusion
- Patella mobilisation if required (medial/lateral, superior/inferior)
- TAQ’s, SLR in brace until able to perform without extension lag
- Passive/active assisted ROM 0-90° for 2 weeks, FROM thereafter (avoiding hyperextension)
- Static bike with no resistance from 2 weeks once sufficient ROM, increasing time as able
- PWB (40% body weight) for 6 weeks using long lever brace initially (locked at 0°)
- If able to SLR without extension lag, change long lever brace to Össur CTi brace at 2 weeks
- Wean off crutches from 6 weeks if normal gait. Aim for FWB in CTi brace from 8 weeks

Criteria for progressing to Phase 2:
- Closed wound
- No/minimal pain with phase 1 exercises
- No/minimal synovitis/effusion
- Normal patellofemoral mobility, tibiofemoral ROM ≥0-120°
- Voluntary quadriceps contraction
- Normal FWB gait (from 6-8 weeks post-op)

AECS: Acute extremity compartment syndrome
CPN: Common peroneal nerve
CTi: Össur CTi (carbon titanium) brace
DVT: Deep vein thrombosis
PEACE: Protection, Elevation, Avoid anti-inflammatories, Compression, Elevation.
Goals:

- Protect the graft
- Full patellofemoral and tibiofemoral ROM
- Correct movement patterns during exercises
- Increase muscular endurance
- Protected lower limb strengthening
- Wean off brace

Post-operative time-based restrictions:

- Brace to be worn at all times until 12 weeks, then wean off as able
- Avoid hyperextension, external tibial rotation, posterior tibial sag and varus for 16 weeks
- Avoid open chain isolated hamstrings exercises until 16 weeks
- Avoid breast stroke, side stroke and whip kicking action in pool until 16 weeks
- Avoid running until 20 weeks
- Progressive return to play if confirmation of stability on stress X-ray at 6 months

Strength:

- Double leg CKC ex’s, progress to single leg as appropriate
- Increase load on the quadriceps, gluteal and calf muscles
- Decrease repetitions and increase resistance for all strength exercises
- Double leg bridging from week 10
- Start open chain isolated hamstrings exercises from 16 weeks

Neuromuscular training:

- Double leg proprioceptive exercises (e.g. Bosu ball)
- Increase difficulty of double leg proprioceptive ex’s (e.g. perturbations, two motoric tasks)
- Control of knee varus and tibial external rotation at lower flexion angles (<45°) during weight bearing exercises, using verbal, manual and visual cues as appropriate.
- Progress to single leg proprioceptive ex’s as appropriate

Cardiovascular exercises:

- Static bike with resistance
- Incline treadmill walking (7% incline)
- Brisk walking programme over changing terrains as able
- Cross trainer or rower from 12 weeks
- Stair/stepper machine from 16 weeks
- Breaststroke, side stroke and whip kicking action in pool until 16 weeks

Criteria for progressing to Phase 3:

- No/minimal pain with phase 2 exercises
- No/minimal synovitis/effusion
- Full ROM
- Correct qualitative performance of phase 2 exercise
- Successfully weaned off brace
- Able to walk briskly 3-5km over changing terrains without pain

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PHASE 3

Goals:
- Maintain good quality movement patterns
- Improve strength and power/rate of force development
- Increase difficulty of neuromuscular and perturbation training
- Start jogging and sports specific training

Post-operative time-based restrictions:
- ▲ Avoid hyperextension, external tibial rotation, posterior tibial sag and varus for 16 weeks
- ▲ Avoid jogging/running until 20 weeks
- ▲ Avoid functional testing (hop for distance, vertical hop, side hop) until 24 weeks
- ▲ Progressive return to play if confirmation of stability on stress X-ray at 6 months

Strength/power:
- ▽ Progressive loading for strengthening exercises
- ▽ Sports-specific progressions e.g. power development, double leg jumping and landing.

Neuromuscular training:
- ▽ Increase difficulty of neuromuscular and perturbation training (e.g. double leg jumps)
- ▽ Emphasise sports specific movements
- ▽ Maintain quality of movement/performance during strength and sports exercises

Cardiovascular exercise:
- ▽ Increase intensity and duration of cardiovascular exercise
- ▽ Build sports specific load regarding energy expenditure (aerobic, anaerobic)

Jogging/running:
- ▲ Graduated running program on treadmill/flat surface from 20 weeks: start with 1-minute run, 4-minute walk (1:4) for 20 minutes.
- ▲ Increase running time by 1 minute each week with a subsequent reduction of walking by 1 minute (2:3, 3:2, 4:1, 5:0)
- ▲ Multi-plane agility once graduated running programme completed

Criteria for progressing to Phase 4:
- ▽ No/minimal pain with phase 3 rehabilitation
- ▽ Correct qualitative performance of phase 3 exercises
- ▽ Limb symmetry index (LSI) >80% for quads and hamstrings strength
- ▽ LSI >80% for hop battery tests (Gustavsson: hop for distance, vertical hop, side hop)
Goals:

- Sports specific drills and gradual return to play program
- Return to sport or physically demanding work

Post-operative time-based restrictions:

⚠️ Do not initiate progressive return to play programme until confirmation of restoration of lateral stability (<2mm side-side difference on varus stress X-ray) at 6 months post-op.

Strength/power:

- Sports-specific progressions e.g. power development, jumping and landing.

Neuromuscular training:

- Increase difficulty of neuromuscular and perturbation training (e.g. single legged jumps)
- Introduce reactive/unanticipated movements
- Emphasise sports specific movements
- Maintain quality of movement/performance during strength and sports exercises

Cardiovascular exercise:

- Build sports specific load regarding energy expenditure (aerobic, anaerobic)

Sports specific training

⚠️ Progressive return to play (e.g. grass/court surface, training with team) if confirmation of restoration of lateral stability (<2mm side-side difference on varus stress X-ray) at 6 months post-op.

Criteria for returning to play*:

- No knee pain with sports specific activities
- No giving way or fear of giving way during sports specific activities
- Active dynamic gait pattern and symmetrical jogging pattern
- Correct quality of performance with all sports specific activities
- Limb symmetry index (LSI) >90% for quads and hamstrings strength
- LSI >90% for hop battery tests (Gustavsson: hop for distance, vertical hop, side hop)
- Drop test with analysis of movement (trunk, knee valgus and knee flexion when landing)
- Use ACL-RSI to measure patient’s psychological readiness/confidence in return to sports
- Restoration of lateral stability confirmed by varus stress X-ray
- Minimal 9 months since surgery

*Due to the lack of available evidence for LCL reconstruction, return to sports criteria is based on evidence following ACL reconstruction.

Originator: Richard Norris, The Knee Resource
References:


